S/N LBADTN0645AA160

+25 tx surfnet

NetVanta Series
(with T1/FT1 or T1/FT1 + DSX-1 Network Interface Module)

ADTRAN

Quick Configuration Guide

61200862L1-42B

March 2005

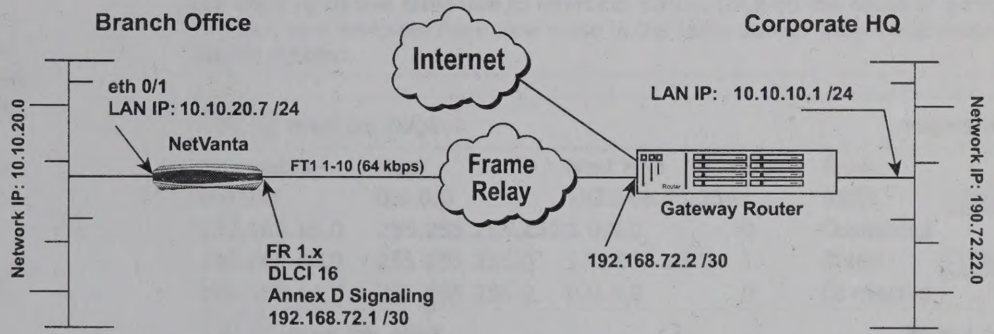
Equipment Required

- Category 5 - UTP cable for connecting the system to the existing network.
- VT100 terminal or PC with VT100 emulation software.
- DB-9 (male) to DB-9 (female) straight-through serial cable for configuring the unit.

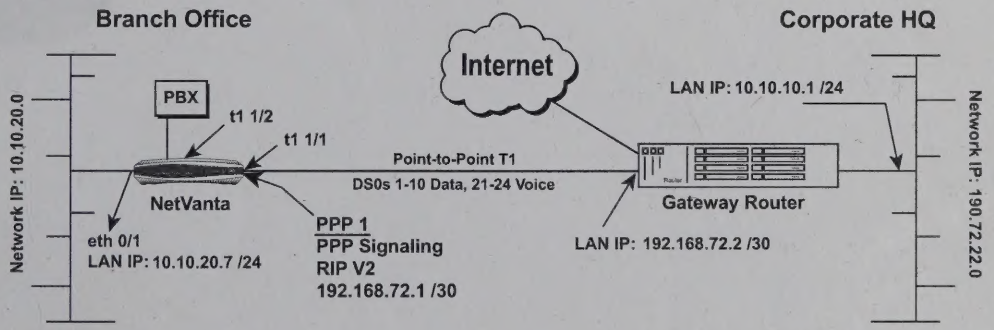
> **NOTE**
>
> *This quick configuration guide provides step-by-step instructions for configuring your application. The configuration scripts are available on the ADTRAN OS Documentation CD.*
>
> *The configuration parameters used in the example outlined in this document are for instructional purposes only. Please replace all underlined entries (**example**) with your specific parameters to configure your application.*

Network Diagrams

Frame Relay Diagram



PPP over Fractional T1 Connection Diagram



S/N LBADTN0645AA160

425 tx surfnet

NetVanta Series
(with T1/FT1 or T1/FT1 + DSX-1 Network Interface Module)

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61200862L1-42B

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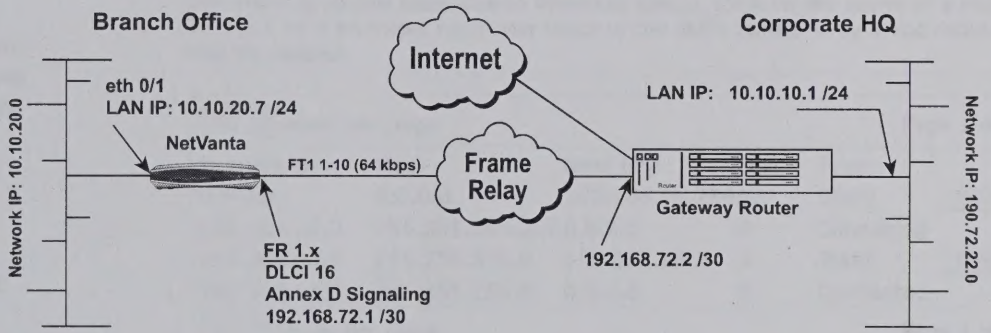
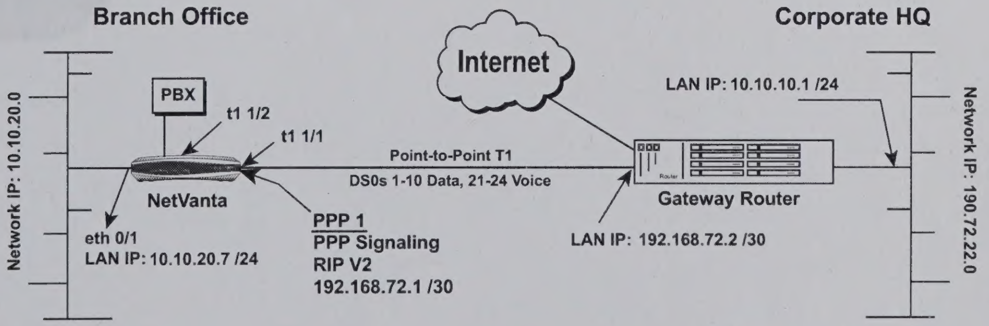
Network Diagrams

Frame Relay Diagram



PPP over Fractional T1 Connection Diagram



NetVanta 1224R

Save **Logout**

System
- Getting Started
- System Summary
- Physical Interfaces
- Passwords
- IP Services
- DHCP Server
- Hostname / DNS
- LLDP

Switch
- Ports
- Port Authentication
- Port Security
- Storm Control
- Link Aggregation
- VLANs
- Spanning Tree
- MAC Forwarding
- Class of Service
- Stacking

Router / Bridge
- Default Gateway
- Routing
- Route Table
- IP Interfaces
- Tunnels
- QoS Wizard
- QoS Maps
- Bridging
- UDP Relay

Firewall
- Firewall Wizard
- General Firewall
- Security Zones

Utilities
- Port Mirroring
- Configuration
- Firmware
- Reboot Unit
- Telnet To Unit

Add a Static Route to the Route Table

Static Routes are often required to reach networks that are not learned via a dynamic routing protocol. Enter the appropriate information below to add a static route or click on a route below to use it as a template for a new route. IP Routing must be enabled in order to add static routes.

Destination Address: ☐ . ☐ . ☐ . ☐ *Enter the network to add to the route table.*

Destination Mask: ☐ . ☐ . ☐ . ☐ *Enter the appropriate mask for this network.*

Gateway:

● Address ☐ . ☐ . ☐ . ☐ *Enter the gateway address to reach this network.*

- OR -

○ Interface <Select Interface> *Select the interface to be used as the gateway.*

Administrative Distance (optional): ☐ *The Distance metric for this network. (Optional parameter)*

Reset Add

Route Table

This is the running version of your route table. Some of your static routes may not show up in this table due to interface status. Click on the name of a route to use it as a template for a new route in the table above. Only static routes can be deleted.

10 rows per page Page 1 of 1

Destination	Mask	Next Hop	Dist	Type	
0.0.0.0	0.0.0.0	192.168.44.254	1	Static	Delete
172.168.16.0	255.255.255.252	0.0.0.0	0	Connected	
192.168.43.0	255.255.255.0	172.168.16.2	1	Static	Delete
192.168.44.0	255.255.255.0	0.0.0.0	0	Connected	

10 rows per page Page 1 of 1

ADTRAN

NetVanta 1224R

Save Logout

System
- Getting Started
- System Summary
- Physical Interfaces
- Passwords
- IP Services
- DHCP Server
- Hostname / DNS
- LLDP

Switch
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Destination Mask:	. . .	*Enter the appropriate mask for this network.*
Gateway:		
● Address	. . .	*Enter the gateway address to reach this network.* *- OR -* *Select the interface to be used as the gateway.*
○ Interface	<Select Interface>	
Administrative Distance (optional):		*The Distance metric for this network. (Optional parameter)*

Reset Add

Route Table

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10 rows per page Page 1 of 1

Destination	Mask	Next Hop	Dist	Type	
0.0.0.0	0.0.0.0	172.168.16.1	1	Static	Delete
172.168.16.0	255.255.255.252	0.0.0.0	0	Connected	
192.168.43.0	255.255.255.0	0.0.0.0	0	Connected	

10 rows per page Page 1 of 1

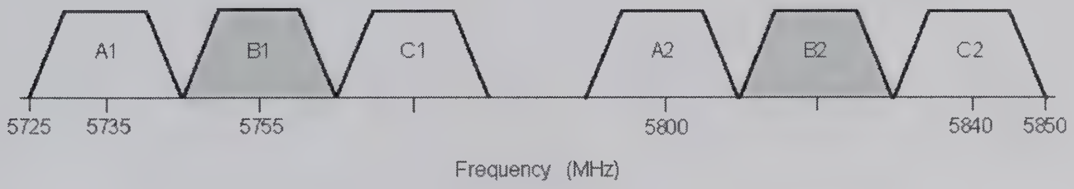
```
Router1>ena
Password:
Router1#sh ru
Building configuration...

Current configuration:
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
service udp-small-servers
service tcp-small-servers
!
hostname Router1
!
enable secret 5 $1$mcjZ$w2O9OEykypfss9N3Cyv/W.
enable password password
!
ip subnet-zero
partition flash 2 8 8
!
!
!
!
interface Ethernet0
 ip address 192.168.44.250 255.255.255.0
 no ip directed-broadcast
 no ip route-cache
 no ip mroute-cache
!
interface Serial0
 ip address 172.168.16.1 255.255.0.0
 no ip directed-broadcast
 no ip route-cache
 no ip mroute-cache
 no fair-queue
 service-module t1 timeslots 13-24
!
interface Serial1
 no ip address
 no ip directed-broadcast
 no ip route-cache
 no ip mroute-cache
 shutdown
!
ip classless
!
!
line con 0
 transport input none
line aux 0
 transport input all
line vty 0 4
 password password
 login
!
end
```

278560

08 w4kn - Bob em 81
0010 k5glt dm81 Gordy
0012 w4etn em83
0014 k0bo dm79 Glenn
0017 ki4aog fm03 SC 5555
0019 n4upx em50 Bob mI
kc2nnu
0022 wa7one Ron DN70
0119 n4ufp em44
0120 k4irf em94 55
0121 ki4ntt em95 56 59
0122 k0xxx 59 em46 Mark
35 n6lcc
0146 k0nhb em05 bill ok 5ok
0249 w04dx gary em74 55

```
!
!
interface vlan 1
  ip address  192.168.44.251  255.255.255.0
  no shutdown
!
!
interface t1 1/1
  tdm-group 1 timeslots 13
  no shutdown
!
interface t1 1/2
  line-length 0
  shutdown
!
interface hdlc 1
  ip address  172.168.16.2  255.255.0.0
  no shutdown
  cross-connect 1 t1 1/1 1 hdlc 1
!
!
!
router rip
  version 2
  redistribute connected
!
!
!
!
!
!
no ip tftp server
no ip tftp server overwrite
ip http server
no ip http secure-server
ip http language English
no ip snmp agent
no ip ftp server
no ip scp server
no ip sntp server
!
!
!
!
!
!
!
!
!
line con 0
  no login
!
line telnet 0 4
  login
  password password
  no shutdown
line ssh 0 4
  login local-userlist
  no shutdown
!
!
!
!
!
end
```

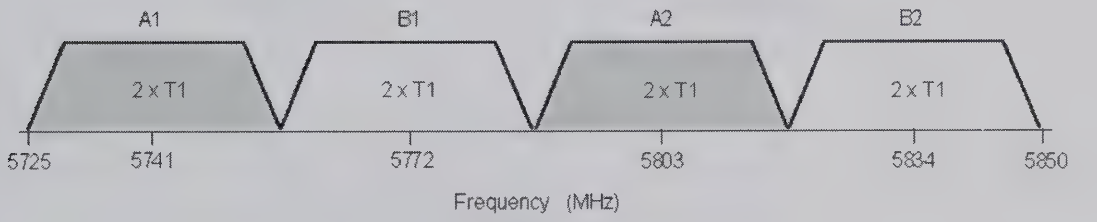
```
Router1#sh ru
Building configuration...
Router1(config)#

Current configuration:#sn ru

!
version 12.0
% Invalid
service timestamps debug uptime
service timestamps log uptime
Building configuration..
no service password-encryptionrent configuration:
service udp-small-serv12.0

!
interface Ethernet05 $1$mcjZ$w2O9OEyky
 ip address 192.168.43.254 255.255.255.0
enable password passw
 no ip directed-broadcast
!
ip subnet-zero
 no ip route-cacheflash 2 8 8
 no ip mroute-cache
!
!
interface Et
 service-module t1 timeslots 13-24
!
interface Serial1
 no ip address
 no ip directed-broadcast
 no ip route-cache
 no ip mroute-cache
 shutdown
!
ip classless
ip route 0.0.0.0 0.0.0.0 172.168.16.2
!
!
line con 0
 transport input none
line aux 0
 transport input all
line vty 0 4
 password password
 login
!
```



Channel Pairs

A1		A2
Tx 5735	→	Rx 5735
Rx 5800	←	Tx 5800
B1		**B2**
Tx 5755	→	Rx 5755
Rx 5820	←	Tx 5820
C1		**C2**
Tx 5775	→	Rx 5775
Rx 5840	←	Tx 5840

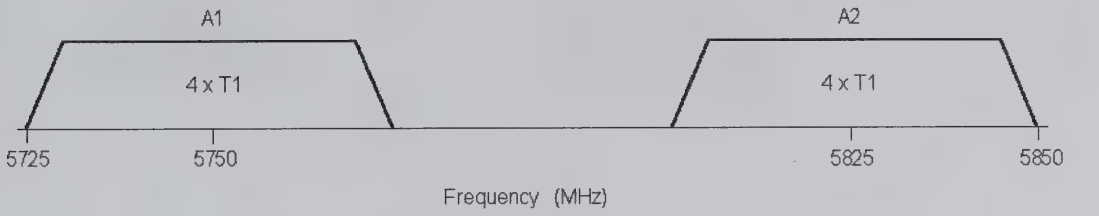
Figure 3-3: Channel Plan, 5.8 GHz 1xT1



Channel Pairs

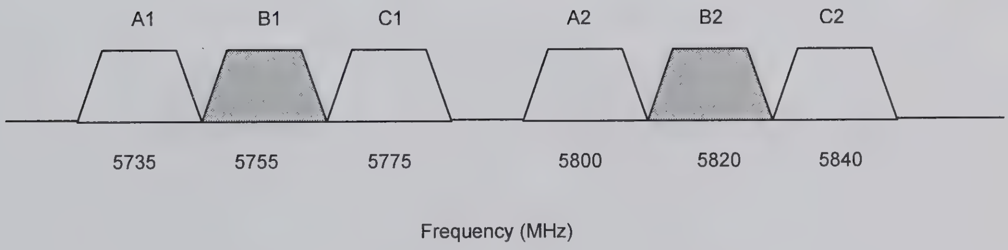
A1		A2
TX 5741	→	RX 5741
RX 5803	←	TX 5803
B1		**B2**
TX 5772	→	RX 5772
RX 5834	←	TX 5834

Figure 3-4: Channel Plan, 5.8 GHz 2xT1



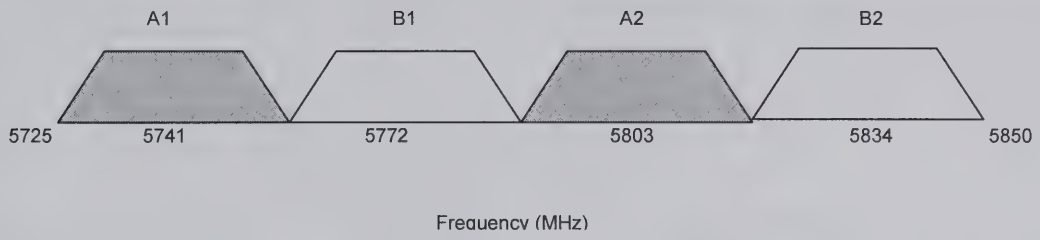
Channel Pairs		
A1		A2
TX 5750	→	RX 5750
RX 5825	←	TX 5825

Figure 3-5: Channel Plan, 5.8 GHz 4xT1 (Lynx.sc, Model 31800)



Channel Pairs		
A1		A2
TX 5735	→	RX 5735
RX 5800	←	TX 5800
B1		B2
TX 5755	→	RX 5755
RX 5820	←	TX 5820
C1		C2
TX 5775	→	RX 5775
RX 5840	←	TX 5840

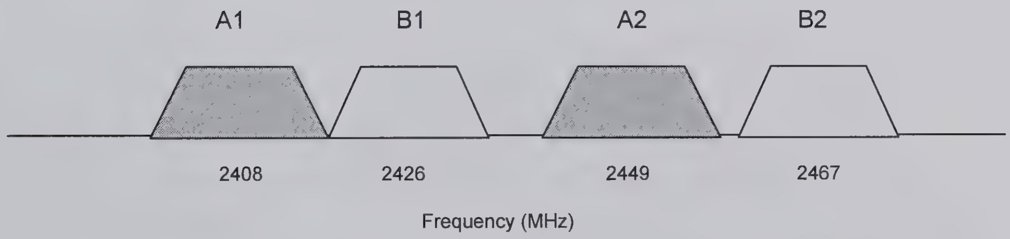
Figure 3-6: Channel Plan, 5.8 GHz 4xT1, Lynx.HD



Channel Pairs

A1		A2
TX 5741	→	RX 5803
RX 5803	←	TX 5741
B1		B2
TX 5772	→	RX 5834
RX 5834	←	TX 5772

Figure 3-7: Channel Plan, 5.8 GHz 8xT1



Channel Pairs

A1		A2
TX 2408	→	RX 2408
RX 2449	←	TX 2449
B1		B2
TX 2426	→	RX 2426
RX 2467	←	TX 2467

Figure 3-8: Channel Plan, 2.4 GHz 4xT1, Lynx.HD

Practice Index 17

Effective May 1987

Practice Index 17 lists those practices that make up a *standard* Tellabs Practice Catalog and also those practices that Tellabs designates *limited distribution.* A star (★) preceding a product description indicates documentation on new products released since the previous Index, or documentation for products that previously had no formal technical manuals. Use the enclosed Order Form to order the practices you need. Please note that some practice revisions listed below are pending at the date of issue of this Index and therefore may not yet be in stock. If this is the case at the time you order, we will send the most recent practice revision(s) available.

Standard-distribution practices are those practices that most of our customers require. Typically, you will not need (or want) all the technical literature listed. In most cases, you'll probably want to order only the new practices marked by stars.

Limited-distribution practices cover products of specialized or limited use. Order those practices that you need.

Series 1 Products

STANDARD DISTRIBUTION

	practice ordering no.
Type 10 Mounting Shelves (1002, 1004, 1006, 1009, 1011, 1012, 1013, 1014), Type 10 Universal Mounting Shelves (1011U, 1012U, 1013U, 1014U), and Type 10 Connectorized Universal Mounting Shelves (1011UC, 1012UC, 1013UC, 1014UC)	8210XX rev C
Type 16 Mounting Shelves and Type 16 Universal Mounting Shelves	821612 rev A
1911 Apparatus Case	821911/831912 rev A
1912 Apparatus Case	821911/831912 rev A
1913 Apparatus Case	841913 rev B
1914, 1914P, and 1914PR Apparatus Cases	831914/831914P/831914PR rev C
★1918 Apparatus Case	811918/811919 rev A
★1919 Apparatus Case	811918/811919 rev A
1920 Apparatus Case	811920 rev A
1922 Apparatus Case	821922 rev C

LIMITED DISTRIBUTION

	practice ordering no.
Type 15 Mounting Shelves	821512 rev A
1914FR 2Way Dial Tie-Trunk Interface Package	811914FR rev A

Series 2 Products

STANDARD DISTRIBUTION

	practice ordering no.
24X Mounting Assembly	8224X rev B
242 Distributive Data Bridge System (2wire)	82242 rev C
243 Low Speed Data Signaling System: 4311 Data Conversion Module and 4312 Loop Interface Module	82243/824311/814312 rev B
243 Low Speed Data Signaling System: 4313 Alarm Station Interface Module	82243/824313 rev B
244 Distributive Data Bridge System (4wire)	82244 rev C
244 Terminate-and-Leave Distributive Data Bridge System (4wire)	810244TL rev A
248RF Mounting Assembly	810248RF rev B
★262-6 and 262-12 NCTE/DST Mounting Assemblies	820262-6/820262-12 rev A
262B-12 NCTE/DST Mounting Assembly	810262B-12 rev B
★262G-6 and 262G-12 NCTE/DST Mounting Assemblies	810262G-6/810262G-12 rev A
262-24, 262-48, and 262-84 NCTE/DST Mounting Assemblies	810262-24/810262-48/810262-84 rev A
263A Data Station Termination Assembly	85263A rev A
263DA and 263DB Data Station Termination (DST) Systems	81263DA/81263DB rev E
263DC Data Station Termination (DST) System	81263DC-1/81263DC-2/81263DC-3 rev B
263E-1, -2, and -3 Data Station Termination (DST) Assemblies	810263E rev B
★263E-4 Data Station Termination (DST) Assembly	810263E-4 rev A
265A Voice Signaling System	82265A rev C
266XR Registered Network Interface System	82266XR rev A
267S Signaling and Terminating Assembly	81267S rev B
281A Teleconferencing System User Guide	81281A rev A
281B Quick Reference Guide	81281BQRG rev A
281A and 281B Teleconferencing System Description	81281A/B-1 rev A
291 Conference/Alerting System	82291 rev B
291R Conference/Alerting System	81291R rev A
292R Conference/Alerting System Description	81292R-1 rev A

LIMITED DISTRIBUTION

	practice ordering no.
263B Data Station Termination (DST) Assembly	83263B rev A
265PA Portavon System	81265PA rev C
269S SF Signaling and Terminating System	82269S rev D
272R 2Wire Loop-to-E&M Converter Assembly	81272R rev A
273AR Power-Failure Transfer Assembly	81273AR rev A
273R-24 Multiple-Circuit Transfer Assembly	81273R-24 rev A
281A and 281B Teleconferencing System Installation and Alignment	81281A/B-2 rev A

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Series 2 Products (continued)

291R Conference/Alerting System: FCC Registration Information	810291R rev C
292R Conference/Alerting System Installation	81292R-2 rev A
292R Conference/Alerting System: FCC Registration Information	81292R rev A
293U One-Way Alerting System Description	81293U-1 rev B
293U One-Way Alerting System Installation	81293U-2 rev A
293UL1 One-Way Alerting System Supplement	S810293UL1 rev A
293UL2 One-Way Alerting System Supplement	S810293UL2 rev A
294 Community Alerting System Description and Installation	820294 rev A

Series 3 Products

STANDARD DISTRIBUTION	practice ordering no.
334 Selective Signaling Terminal (SST) System Description*	810334FP2-1
334 Selective Signaling Terminal (SST) System Installation*	810334FP2-2

LIMITED DISTRIBUTION	practice ordering no.
3228 Data Set Transmit/Receive Module	823228 rev B
334BR Selective Branch Exchange (SBX) System Installation	81334BR-2 rev A
334FP3 Selective Branch Exchange (SBX) System Installation	81334FP3-2 rev A
★3404 SST 4Wire Interface Module	823404 rev A
3404R SST 4Wire Interface Module	813404R rev B
3405 SST Tone Generator	813405/813406 rev A
3406 SST Tone Generator and DTMF Transceiver	813405/813406 rev A
★3407 SST Dual 4Wire Station Circuit	833407 rev A
3408A and 3408B SST External Control Modules	813408A/813408B rev A
★3409 SST 4Wire E&M Off-Net Access Module	823409 rev A
★3410A and 3410B SST 2Wire PBX Trunk Access Modules	833410A/833410B rev A
3411A and 3411B SST PBX Line Access Module	813411A/813411B rev A
3420 Dual DTMF Receiver Module	813420 rev B
345 Status/Control Concentrator System Description	81345-1 rev A
345 Status/Control Concentrator System: Emergency-Alerting Software Feature Package 1	81345FP1 rev A
345 Status/Control Concentrator System: Emergency-Alerting Software Feature Package 1A	81345FP1A rev A
345 Status/Control Concentrator System Installation	81345-2 rev A
3451 SCC Master Control Module	813451 rev A
3452 SCC 50-Line Input Module	813452 rev A
3453 SCC 24-Pair Output Module	813453 rev A
3456 SCC Dual Serial Port Module	813456 rev A
3458 Bus Extender Module	813458 rev A
SBX User's Guide	(no assigned no.)

**Includes information on 81334C and 81334D Mounting Assemblies formerly contained in separate practice (section 81334C/81334D, rev B).*

Series 4 Products

STANDARD DISTRIBUTION	practice ordering no.
4001 Line Amplifier	824001/824002 rev C
4001A Line Amplifier	824001A rev A
4001C Prescription Line Amplifier	834001C/834002C rev B
4001F 4Wire-4Wire Terminal Repeater with Sealing Current	814001F/814002F rev A
4003C Line Amplifier with Loopback	814003C rev B
4006 Compression Amplifier	814006 rev B
4008 Program Amplifier	834008 rev H
4012 Program Distribution Amplifier	814012 rev D
4018 Program Distribution Amplifier	814018/814018A rev B
★4024B 2Wire-4Wire Network Terminating Repeater (24V4)	824024B rev A
4024C 4Wire-2Wire Terminal Repeater	814024C/814024D rev A
★4024CL 4Wire-2Wire Terminal Repeater	814024CL rev A
4024E 4Wire-2Wire Terminal Repeater	814024E rev A
4041 Amplitude/Delay Equalizer	824041 rev A
4251 2Wire DDB Combiner Amplifier	814251 rev C
4251A Prescription 2Wire DDB Combiner Amplifier	814251A rev A
4252 2Wire DDB Splitter Amplifier	814252 rev C
4252A Prescription 2Wire DDB Splitter Amplifier	814252A rev A
★4255 and 4255S 2Wire DDB Quad Termination modules	824255/824255S rev B
4405 4Wire Station Termination module	824405 rev C
4406 KTU 4Wire Station Termination module	824406 rev B
4408 4Wire Line Termination module	814408 rev C
4409 Pickup Relay and Station Circuit module	814409 rev A
★4410 and 4410S Pad/Transformer modules (prescription)	814410/814410S rev A
4411A Pad/Transformer/Tone Loopback Module	824411A rev E
4412C Data Station Termination module	814412C rev C
4412D Data Station Termination module	814412D rev B
4416A and 4416B Data Station Termination modules	824416/824416A/824416B rev A
4417A and 4417B Data Station Termination modules	824417/824417A/824417B rev A
4418A Data Station Termination module	824418/824418A rev A
4419B and 4419C Data Station Termination modules	814419B/814419C rev A

Series 4 Products (continued)

4420B Data Station Termination module	814420B rev A
★4420D RA Series 4Wire-4Wire Data Station Termination module	814420D rev A
★4420R RA Series 4Wire-4Wire Data Station Termination module	814420R rev A
4422 Dual Repeat Coil	814421/814422/814423 rev C
4423 Dual Protected Repeat Coil	814421/814422/814423 rev C
4425 Wideband Repeat Coil	824424/824425 rev C
4444 4Wire 4Way Active Bridge (voice)	814444/814446 rev B
4445 Dual 5Way Active Data Bridge	824445/824449 rev C
4445A Dual 5Way Balanced Active Data Bridge	814445A rev A
4446 4Wire 6Way Active Bridge (voice)	814444/814446 rev B
4449 Dual 9Way Active Data Bridge	824445/824449 rev C
4451 and 4451A Distributive Data Bridge (DDB) modules	844451/844451A rev A
4452A Distributive Data Bridge (DDB) module	814452A rev B
4452B Distributive Data Bridge (DDB) module	814452B rev A
4453 DDB Termination module	834453 rev A
4454 DDB Termination module	864454/864454A/864455/864455A rev B
4454A DDB Termination module	864454/864454A/864455/864455A rev B
4454B DDB Termination module supplement	S814454B rev A
4455 DDB Termination module	864454/864454A/864455/864455A rev B
4455A DDB Termination module	864454/864454A/864455/864455A rev B
4455B DDB Termination module supplement	S814455B rev A
4456B Active DDB Termination module	814456B rev C
4456C Active DDB Termination module supplement	S814456C rev A
4456D Active DDB Termination module supplement	S814456D rev A
4458 DTMF Control module	814458 rev A
4460 Terminate-and-Leave Test Access Bus Module	814460 rev A
4462B 4Wire 2Way Conference Bridge module	834462/824462B rev A

LIMITED DISTRIBUTION	practice ordering no.
4042 4Wire-2Wire Repeater	814042 rev B
★4050 Cable Diagnostic Module for 24X Mounting Assembly	814050 rev A (1 January 1981)
4201 Terminating Set	824201/824203 rev G
4203 Terminating Set	824201/824203 rev G
4311 Data Conversion Module	82243/824311/814312 rev B
4312 Loop Interface Module	82243/824311/814312 rev B
4312A Loop Interface Remote Control Module	824312A rev A
4313 Alarm Station Interface Module	82243/824313 rev B
4401 Pad Module	814401/814402/814403/814404 rev C
4402 Pad/Transformer, Facility	814401/814402/814403/814404 rev C
4402S Pad/Transformer, Facility, with Sealing Current	814402S rev B
4403 Pad/Transformer, Office	814401/814402/814403/814404 rev C
4404 Pad/Transformer, Station	814401/814402/814403/814404 rev C
4404S Pad/Transformer, Station, with Sealing Current	814404S rev C
4412U Data Station Termination	814412U rev A
4413 DST Voice Alternate Module	814413 rev C
4414 AVD (Alternate Voice/Data) Amplifier	814414 rev A
4502U Prescription Line Amplifier	814502U rev A
4744 4Wire Line Amplifier	824744 rev F
4901 4Wire Pad Module	814901/814902/814910 rev D
4902 4Wire Pad/Transformer Module	814901/814902/814910 rev D
4910 4Wire Bypass Module	814901/814902/814910 rev D
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Series 6 Products

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6004 2Wire Auto Ringdown Module	826003/826004 rev F
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6008B FXO-to-E&M Signaling Converter subassembly	816008B rev A
6008C DX-to-E&M Signaling Converter subassembly	816008C rev A
6008D E&M-to-E&M Signaling Converter subassembly	816008D rev A
6041 2W-2W DX-E&M Terminal Repeater	816041 rev B
6042 4W-2W DX-E&M Terminal Repeater	826042 rev C
6042A 4W-2W DX-E&M Terminal Repeater with Loopback	826042A rev A
★6043 4W-4W or 4W-2W DX-E&M Terminal Repeater (Issue 2)	I826043 rev A*
★6043A 4W-4W or 4W-2W DX-E&M Terminal Repeater (Issue 3)	836043/836043A rev A
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6044A 4W-4W DX Terminal Repeater w/Loopback	826044A rev A
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★6048 and 6048A 4W-2W or 4W-4W SF-E&M Terminal Repeaters	836048/836048A rev A
6073 DTMF/Dial Decoder	816073 rev C
6113 E&M-to-Loop DLL (FXS) Module	816113 rev B
6114 Loop-to-E&M DLL (FXO) Module	816114 rev A
6123 and 6123A 4W-2W SF-FXS Terminal Repeaters	836123/836123A rev A
6124 and 6124A 4W-2W SF-FXO Terminal Repeaters	836124/836124A rev A
6131 2W-4W or 4W-4W Terminal Interface Module	816131 rev A
★6132 2W-4W or 4W-4W Network Terminal Interface Module	816123 rev A

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*Installation guide.

Series 6 Products (continued)

★6161 and 6161A 4W-4W SF-E&M Terminal Repeaters (Issue 2)	816161/816161A/816161B/816161C rev A w/addendum
★6162 and 6162A 4W-2W SF-E&M Terminal Repeaters (Issue 2)	816162/816162A/816162B/816162C rev A w/addendum
★6163 and 6163A 4W-2W SF-FXS Terminal Repeaters (Issue 2)	816163/816163A/816163B/816163C rev A w/addendum
★6164 and 6164A 4W-2W SF-FXO Terminal Repeaters (Issue 2)	816164/816164A/816164B/816164C rev A w/addendum
★6166 and 6166A 4W-4W DX-E&M Terminal Repeaters (Issue 2)	816166/816166A/816166B/816166C rev A w/addendum
★6168 4W-4W or 4W-2W DX-E&M Terminal Repeater	816168 rev A
★6168A 4W-4W or 4W-2W DX-E&M Terminal Repeater with Loopback	816168A rev A
6170 4W-4W SF-E&M Intermediate Repeater	816170 rev A
6171 4W-4W SF-FXS Intermediate Repeater	816171 rev A
6172 4W-4W SF-FXO Intermediate Repeater	816172 rev A
★6173 4W-4W SF-DX Intermediate Repeater	816173 rev A
6177 4W-2W SF-FXS Intermediate Repeater	816177 rev A
6178 4W-2W SF-FXO Intermediate Repeater	816178 rev A
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★6919A Echo Canceller	816919A rev A
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6103 FXS Signaling Converter	816103 rev E
6104 FXO Signaling Converter	826104 rev B
6105 ARD (Ringdown) Signaling Converter	836105 rev D
6106 Data ARD Signaling Converter	816106 rev B
★6122 and 6122A 4W-2W SF-E&M Terminal Repeaters	I836122/836122A rev A*
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6212 Quad E&M Converter	816212 1 April 1980
6251 SSN Trunk Module	826251 rev B
6850 Common Oscillator Module	816850 rev B
6922 2Wire E&M SF Signaling Set	836922 rev C
6923 2Wire FXS SF Signaling Set	836923 rev C
6924 2Wire FXO SF Signaling Set	836924 rev D
6942 4Wire E&M SF Signaling Set	836942/836942L rev B
6943 4Wire FXS SF Signaling Set	836943 rev B
6944 4Wire FXO SF Signaling Set	836944 rev B
6971 Common Interface Module (2W/4W)	816971 rev B

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*Installation guide.

Series 7 Products

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7002 Dial Long Line Module and 7002A Network Terminating Dial Long Line Module (LS/GS)	827002/817002A rev C
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7206 2Wire Switched-Gain Compression Amplifier	817206 rev B

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Series 8 Products

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★8005 24/48Vdc Power Supply (230Vac input)	828005 rev A
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8011, 8012, and 8013 Power Supplies	818011/818012/818013 rev A
8015 24Vac Power Supply	818015 rev A
8017 48Vdc Power Supply	828017 rev A
8018 24Vac Power Supply	818018 rev A
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8021 Power Supply (48Vdc)	818021 rev A
8035 Power Supply (24/48Vdc)	818035 rev B
8050 Power and Ringing Supply	828050 rev B
8101 30Hz Ringing Generator	818101 rev B
8102 Ringing Generator	828102 rev B
★8103 Ringing Generator	828103 rev A
8104 Ringing Generator	818104 rev A
8108 20Hz Ringing Generator	818108 rev B
★8111 30Hz Ringing Generator	818111 rev A
8205 Dual Battery Filter and Fuse Distribution Panel	838205 rev A
8206 Dual Battery Filter, Fuse Distribution, and Ballast Lamp Panel	828206 rev A

LIMITED DISTRIBUTION

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★8210 and 8210A Fuse Panels	818210/818210A/818210B rev A
★8211 and 8211A Fuse Panels	828211/828211A rev A
8271 Ballast Lamp Panel	818271/818272 rev B
8272 Ballast Lamp Panel	818271/818171 rev B

Series 9 Products

STANDARD DISTRIBUTION

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9002 Relay Module	819001/819002 rev C
9003 Ringing Interrupter Relay Module	829003 rev C
9003A Ringing Interrupter Control Module	819003A rev B
9005 Loop Current Detector module	829005 rev A
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9021 Fuse Module	829021 rev B
9401 4Wire Transmission Only (4TO) D4 Channel Unit module	819401/819402 rev B
9402 4Wire Equalized Transmission Only (4ETO) D4 Channel Unit module	819401/819402 rev B
9406 4Wire Universal SF (4USF) D4 Channel Unit module	819406 rev A
9436 Dual UVGS COT Channel Unit module	819436 rev A
9436A Dual UVGS COT Channel Unit module (Base Ten capability)	819436A rev A
9437 Dual UVGS RT Channel Unit module	819437 rev A
9437A Dual UVGS RT Channel Unit module (Base Ten capability)	819437A rev B
★9437C Dual UVGS RT Channel Unit module w/Automatic Gain Control	819437C rev A
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9608A Program Distribution Amplifier	829608/829608A rev A
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★9802 Card Extender	819801/819802 rev A
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9903 Ringing Interrupter subassembly	829903 rev D
9908A Active Slope Equalizer subassembly	829908A rev A
9908B Active Prescription Equalizer subassembly (WECo 309B-equivalent)	839908B rev A
★9921 SF Tone Bypass subassembly	839921/839921L rev A
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993X Precision Balance Network subassemblies	83993X rev A
9952X Band-Splitting Filter subassemblies	819952X rev A
9961A FXS Signaling Converter subassembly	819961A rev A
9961BR FXO Signaling Converter subassembly	829961BR rev A
9961C Ringdown Signaling Converter subassembly	829961C rev A
9961D DX Signaling Converter subassembly	819961D rev B
9961E Pulse Link Repeater subassembly	819961E rev A

LIMITED DISTRIBUTION

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9026 Jackfield Module	819026 rev A
9104 INWATS Line Relay Module	819104 rev A
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9121 Tone Supply Module	819121 rev B
9131 Universal Timer Module	819131 rev A
9132 Ringing Timer Module	829132 rev B
9133 Long Interval Timer Module	829133 rev C
9134 Quad Disconnect Timer Module	819134 rev A
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9192 2Wire ARD Conference Access Trunk Circuit	829192 rev B
9193 2Wire ARD Conference Originate Line Circuit	829193 rev B
9194 2Wire Conference Amplifier	839194 rev B
9195 2Wire ARD Conference Remote Answer Trunk Circuit	829195 rev A
9196 2Wire ARD Loop Start Access Trunk Circuit	829196 rev B
9291 2Wire ARD Conference Terminate Line Circuit	819291 rev B
9293 2Wire ARD Conference Originate Line Circuit	819293 rev A
9294 2Wire Conference Amplifier	819294 rev A

Series 9 Products (continued)

9296 2Wire ARD Trunk Access Module	819296 rev A
9332 Ringing Interrupter and Fuse Module	829332 rev A
9391 Ten-Line One-Way ARD Line Circuit Module	819391 rev A
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9395 Supervisory Interface Module	819395 rev A
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9662 4Wire E&M SF Signaling Set with Gain	849662 rev A
9807 Card Extender	819807 rev B
9901 Pulse Corrector subassembly	819901/819902 rev B
9906 Reverse Battery Adapter subassembly	819906 rev A

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4462B 4Wire 2Way Conference Bridge Module

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1. general description

1.01 The Tellabs 4462B 4Wire 2Way Conference Bridge module (figure 1) provides active bidirectional level control and impedance matching for two 4wire voice-frequency (VF) transmission facilities. When mounted in a Tellabs 24X Mounting Assembly, multiple 4462B modules establish a voice-paging conference bridge. This type of bridge is an isolated network that does not require dialing. Instead, one simply picks up the handset of a telephone in the system and speaks. The voice is heard over a loudspeaker paging system, and those who pick up their handsets automatically enter the bridge. (Telephone sets and the loudspeaker paging system must be obtained separately.)

1.02 When the 4462B is used in a Tellabs 24X Mounting Assembly, incoming signals at the channel-1 receive port are cross-coupled to the channel-2 transmit port, and those appearing at the channel-2 receive port are cross-coupled to the channel-1 receive port. In addition, the VF signals appearing at the channel-1 and channel-2 receive ports are combined and coupled to the voice conference bus of the 24X Assembly backplane. These conference buses transfer the combined VF signals to the transmit ports of adjacent 4462B modules used in the conference bridge. An option switch disables the transfer of combined VF signals to module positions to the left, to the right, or to both the left and the right, thus enabling more than one discrete bridge to coexist within the same 24X Assembly.

1.03 For each 4wire channel of the 4462B, receive and transmit levels can be adjusted while the module is in place and operating. Receive input levels from −23 to +7dBm can be set by front-panel *rcv level* controls without the use of a transmission measuring set TMS). This is made possible by two front-panel LED's that serve as overrange and underrange indicators. Transmit output levels from −20 to +10dBm (based on internal bus levels) are set by front-panel *xmt level* controls and verified at the distant end. Opening bantam-type jacks on the front panel facilitate alignment and maintenance procedures. Both channel-1 and channel-2 receive and transmit facility-side ports maintain constant input and output levels regardless of the terminating impedances selected.

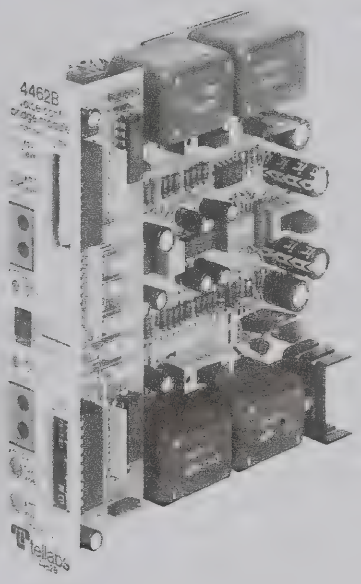


figure 1. 4462B 4Wire 2Way Conference Bridge module

1.04 Two types of amplitude equalization are available in the 4462B's channel-1 and channel-2 receive paths for post-equalization of the incoming pairs. For loaded cable, a compromise bump equalizer inserts a 3dB bump at 3200Hz (re 1004Hz) and provides 1.5dB of roll-off at 404Hz (re 1004Hz). For nonloaded cable, an active prescription slope equalizer introduces from 0 to 7.5dB of gain at 2804Hz (re 1004Hz) in switch-selectable 0.5dB increments. Either or both equalizers can be inserted in the signal path via option switches located on the front panel. When both equalizers are used simultaneously, their effects on the receive path frequency response are additive. Because neither equalizer in a channel affects 1004Hz levels of that channel, equalization can be introduced not only before but also after levels are set, with no interference between level and equalization adjustments.

1.05 The transformer-coupled transmit and receive facility-side ports in the 4462B's two 4wire channels can be switch-optioned for 150-, 600, or 1200-ohm balanced terminating impedance. This impedance selection is separate and independent for each channel. Within each channel, however, a given impedance switch setting provides the same terminating impedance for both of that channel's facility-side ports. All four transformers on the module are center-tapped to derive balanced simplex (SX) leads. As an alternative to normal SX-lead derivation, the module can be switch-optioned to apply 20mA of internally derived sealing current at

the channel-1 and channel-2 facility ports. A 34 to 51mA "ZAP" feature provides a momentarily higher initial level of sealing current when the module is powered up. Front-panel LED's light when the internal sealing-current option is selected; these are the same LED's used to indicate receive levels when the front-panel switch is in the test position. All ports of the 4462B are surge-protected.

1.06 An internally regulated power supply in the 4462B permits operation on −22 to −56Vdc or, with internally generated sealing current applied to both channels, on −42 to −56Vdc filtered, ground-referenced input. When supplied with −48Vdc, the module requires a maximum of 75mA without sealing current; idle current is 40mA. If sealing current is selected, an additional 42mA is required. The power supply features reverse-battery protection and transient-limiting circuitry, while a filter network minimizes noise and ripple.

1.07 A Type 10 module, the 4462B mounts in one position of a Tellabs 24X Mounting Assembly or in one position of a Tellabs Type 10 Mounting Shelf. The 24X Mounting Assembly is a prewired, connectorized mounting shelf available in 19- and 23-inch versions. The Type 10 Mounting Shelf is available in several versions for relay-rack or apparatus-case installation. Up to 12 modules can be mounted across a 19-inch Type 10 Shelf or 24X Assembly, while up to 14 modules can be mounted across a 23-inch Type 10 shelf or 24X Assembly.

2. application

2.01 The 4462B 4Wire 2Way Conference Bridge module is designed for use on two 4wire voice-frequency transmission facilities, where it provides active bidirectional level control and impedance matching and establishes a common conference bridge arrangement when mounted in a Tellabs 24X Assembly. In addition, the 4462B also provides receive-path post-equalization for both 4wire facilities (channel 1 and channel 2). Within a 4462B module, the receive port of one 4wire channel is connected to the transmit port of the adjacent 4wire channel of the same module while maintaining minimum cross-coupling to the transmit port of its own associated 4wire channel. Thus, by itself each module establishes a dual 4wire conference bridge.

2.02 Multiple 4462B modules can be installed in a 24X Assembly to provide voice-conferencing arrangements. Figure 2 shows a typical 4wire 6way voice-conference bridge configuration involving three 4462B modules.

2.03 Levels in the receive and transmit ports of both 4wire channels are individually set via front-panel controls. The receive ports are arranged such that incoming voice-frequency signals, whose levels can range from −23 to +7dBm, are adjusted and transferred to the common conference buses at a predefined level. The transmit ports can be adjusted to provide transmission output levels ranging from −20 to +10dBm. All ports are equipped with constant-power circuitry to ensure that input and output signal levels remain constant regardless of the selected terminating impedance. For example, levels can be set during alignment using 600-ohm module and test equipment settings, and they will remain the same when the module's terminating impedance is changed to 150 or 1200 ohms.

2.04 Both the receive and transmit transmission levels, as well as the internal bus levels, can be quickly and easily adjusted with the 4462B module mounted in its normal operating position in the 24X Assembly or Type 10 Shelf. The only external test equipment required is a transmission measuring set (TMS) at the distant end. The module's front-panel *test* switch, *seal cur 1* and *seal cur 2* LED's, and internal reference circuitry eliminate the need for local test equipment during level alignment. When the *test* switch is set to either *test 1* or *test 2*

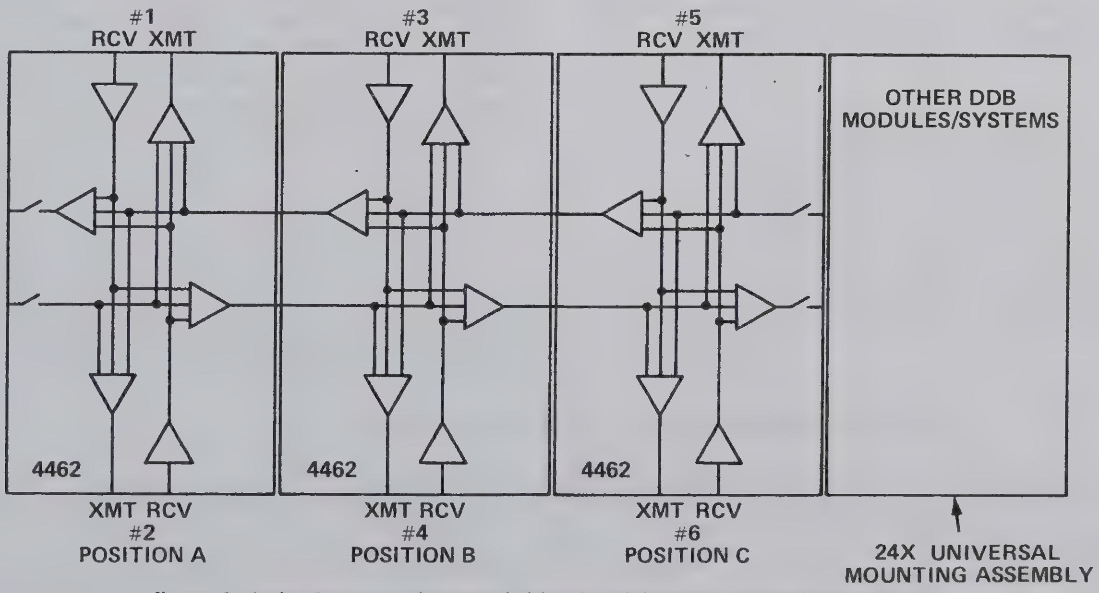


figure 2. 4wire 6way conference bridge involving three 4462B modules

(for channel 1 or channel 2, respectively), the channel being aligned is removed from the bridge, the *seal cur 1* LED becomes an overrange indicator while the *seal cur 2* LED an becomes an underrange indicator. The *rcv level* control is properly adjusted when both LED's are off in the *test 1* or *test 2* mode. The transmit level is then adjusted to provide an appropriate level reading at the distant end. After the levels for both channels are set, the *test* switch is then reset to the *off* position, returning the module to normal service and reconfiguring the LED's to serve their primary functions as sealing-current-flow indicators.

amplitude equalization

2.05 Two switch-selectable types of receive-path post-equalization are available in each of the 4462B's two 4wire channels: compromise bump equalization for loaded cable and prescription slope equalization for nonloaded cable. Because the transmit path is generally used to coordinate levels rather than to reduce facility loss, no transmit equalization is available. Transmit, ie pre-, equalization tends to amplify high-frequency signals to a level conducive to crosstalk. Receive, ie post-, equalization not only eliminates this problem but also expedites the equalization procedure because the circuit is easier to equalize at the receive end.

2.06 The compromise bump equalizer inserts a 3dB bump at 3200Hz (re 1004Hz) and provides 1.5dB of roll-off at 404Hz. This mode of equalization is selected by setting the *ld/nld* front-panel switch to *ld*. The frequency response of this equalizer is shown in table 1.

2.07 From 0 to 7.5dB of prescription-set active slope equalization at 2804Hz (re 1004Hz) can be introduced into the 4462B's receive path to compensate for the frequency-response characteristics of nonloaded cable. This equalization is introduced in discrete 0.5dB increments via front-panel DIP switches. The module's equalized gain response is not affected by flat gain or flat loss adjustments, which are used to provide precise transmission alignment. The frequency response of the slope equalizer is shown in table 2. For nonloaded cable facilities where 2804Hz loss (re 1004Hz) exceeds 7.5dB, an additional 2dB of equalized gain can be obtained through use of the module's 150-ohm terminating impedance option.

2.08 It is possible to insert both equalizers into the receive paths simultaneously. If this is done, the resultant frequency response of the two cascaded equalizers would be the sum of the individual frequency responses shown in tables 1 and 2. For example, if 1.0dB of slope equalization is introduced into the receive path and the *ld/nld* switch is set to *ld*, adding each gain value in the 1.0 row of table 1 to the gain value of the ld row of table 2 would provide the resultant response. We recommend that, if both equalizers are used simultaneously, only a small amount of slope equalization be used. Large amounts may cause instability in the form of ringing or oscillation.

impedance matching

2.09 Impedance-matching transformers at the receive and transmit ports of both 4wire channels can be individually switch-optioned for balanced 1200-, 600-, or 150-ohm terminating impedances. The 1200-ohm option is used for interface with loaded cable; the 600-ohm option, for interface with nonloaded cable or carrier; and the 150-ohm option, to provide a small amount of slope equalization (in addition to any provided by the module's slope equalizer) for long sections of nonloaded cable through the deliberate impedance mismatch. In addition, each of the four impedance-matching transformers is center-tapped to derive a balanced simplex lead. These can be used, for example, if sealing current from a source *external* to the module is to be applied to metallic 4wire facilities.

sealing current

2.10 An option switch on the 4462B selects either internally generated sealing current or normal simplex-lead derivation at the module's facility-side ports. When the internal-sealing-current option is selected, 20mA of sealing current flows from the transmit output ports and returns via the receive input ports. A ZAP feature integral to the 4462B's sealing-current supply provides a momentarily higher amount of current to eliminate existing oxidation or corrosion when the sealing-current option is initially activated. Front-panel LED's (*seal cur 1* and *seal cur 2;* the same used in the level-alignment procedure) function as sealing-current flow indicators.

sidetone

2.11 Sidetone at a −20dB level can be independently selected for each 4wire channel via switch option if required.

mounting

2.12 The 4462B mounts in one position of a Tellabs 24X Assembly or a Tellabs Type 10 Shelf. When using the 24X Assembly, the bypass switch on the 24X backplane must be off for each module position containing a 4462B. A switch option on the 4462B enables or disables extension of the common conference bridge to module positions to the left or right of the 4462B's own position in the 24X Assembly.

ld/nld switch setting	equalized gain (in dB) introduced at various frequencies									
	300Hz	404Hz	500Hz	800Hz	1004Hz	1500Hz	1800Hz	2500Hz	2804Hz	3200Hz
nld	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ld	−2.51	−1.48	−0.91	−0.81	0.0	+0.22	+0.33	+0.58	+1.07	+3.08

table 1. Typical compromise bump equalization frequency response

receive equalizer switch setting (dB)	equalized gain (in dB) introduced at various frequencies									
	300Hz	404Hz	500Hz	800Hz	1004Hz	1500Hz	1800Hz	2500Hz	2804Hz	3200Hz
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.5	−0.18	−0.17	−0.15	−0.06	0.0	+0.17	+0.26	+0.42	+0.48	+0.54
1.0	−0.37	−0.33	−0.29	−0.13	0.0	+0.34	+0.52	+0.85	+0.96	+1.08
1.5	−0.56	−0.51	−0.44	−0.20	0.0	+0.50	+0.77	+1.28	+1.44	+1.62
2.0	−0.75	−0.68	−0.60	−0.26	0.0	+0.67	+1.03	+1.72	+1.94	+2.18
2.5	−0.95	−0.86	−0.75	−0.33	0.0	+0.83	+1.29	+2.15	+2.43	+2.74
3.0	−1.14	−1.03	−0.90	−0.40	0.0	+1.00	+1.54	+2.58	+2.93	+3.31
3.5	−1.32	−1.19	−1.04	−0.45	0.0	+1.17	+1.81	+3.03	+3.44	+3.89
4.0	−1.48	−1.33	−1.16	−0.50	0.0	+1.30	+2.01	+3.30	+3.86	+4.36
4.5	−1.67	−1.51	−1.31	−0.57	0.0	+1.45	+2.26	+3.82	+4.36	+4.98
5.0	−1.86	−1.68	−1.46	−0.64	0.0	+1.60	+2.49	+4.26	+4.88	+5.59
5.5	−2.04	−1.84	−1.60	−0.69	0.0	+1.75	+2.73	+4.70	+5.40	+6.21
6.0	−2.22	−2.00	−1.74	−0.75	0.0	+1.95	+3.72	+5.14	+5.93	+6.87
6.5	−2.40	−2.16	−1.87	−0.81	0.0	+2.03	+3.18	+5.56	+6.45	+7.52
7.0	−2.57	−2.31	−2.00	−0.86	0.0	+2.16	+3.39	+5.98	+6.97	+8.19
7.5	−2.66	−2.46	−2.13	−0.91	0.0	+2.28	+3.59	+6.38	+7.48	+8.86

table 2. Typical prescription slope equalization frequency response

3. installation

inspection

3.01 The 4462B 4Wire 2Way Conference Bridge module should be visually inspected upon arrival to find possible damage incurred during shipment. If damage is noted, a claim should immediately be filed with the carrier. If stored, the module should be visually inspected again prior to installation.

mounting

3.02 The 4462B mounts in one position of the Tellabs 24X Mounting Assembly or in one position of the Tellabs Type 10 Shelf. The latter is available in configurations for both relay-rack and apparatus-case installation. The module plugs physically and electrically into a 56-pin connector at the rear of the assembly or shelf.

installer connections

3.03 If the 4462B module is to be installed in a 24X Assembly, no external connections to the module need be made, as the assembly is internally prewired to accommodate the 4462B module without additional wiring. All external connections to the assembly itself are made quickly and easily via plug-ended cables. Refer to the 24X Mounting Assembly practice (section 8224X) for details.

Note: *The bypass switch on the 24X backplane must be in the* **OFF** *position for each module position in which a 4462B is installed.*

3.04 If the 4462B is to be installed in an unwired Type 10 Shelf, external connections to the module must be made. Before doing so, ensure that power is off and that modules are removed. The 4462B module should be put into place only after it is properly optioned and after wiring is completed.

3.05 Table 3 lists external connections to the 4462B. If the module is to be installed in a Type 10 Shelf, all connections are made via wire-wrapping to the 56-pin connector at the rear of the module's shelf position. Pin numbers are found on the body of the connector.

connect:	to pin:
RCV #1 TIP	7
RCV #1 RING	13
RCV #1 SX	44
XMT #1 TIP	41
XMT #1 RING	47
XMT #1 SX	48
RCV #2 TIP	9
RCV #2 RING	43
RCV #2 SX	8
XMT #2 TIP	45
XMT #2 RING	49
XMT #2 SX	14
PR conference	19
FR bus right	31
PL conference	27
FL bus left	23
−BATT (−22 to −56Vdc, −42 to −56Vdc with sealing current)	35
GND (ground)	17

table 3. External connections to 4462B

options

3.06 Optioning of the 4462B consists of selecting the receive and transmit terminating impedances, adjusting the receive and transmit levels, enabling or disabling sidetone, selecting sealing current or simplex leads, setting the bridge-extension switch, and setting the receive-channel equalizers. These options are selected as described below. Locations of the option switches on the module are shown in figure 4.

terminating impedances

3.07 On the 4462B's facility side, channel-1 receive and transmit terminating impedances are both selected via switch *S2,* while channel-2 receive and transmit terminating impedances are both selected via switch *S1.* Set each switch to the *150, 600,* or *1200* position as required.

sidetone

3.08 Application of sidetone is controlled by two-position DIP switch *S6.* To add sidetone to channel 1, set *S6-2* to *ON.* To add sidetone to channel 2, set *S6-1* to *ON.* Set *S6-1* and/or *S6-2* to *OFF* if sidetone is not required.

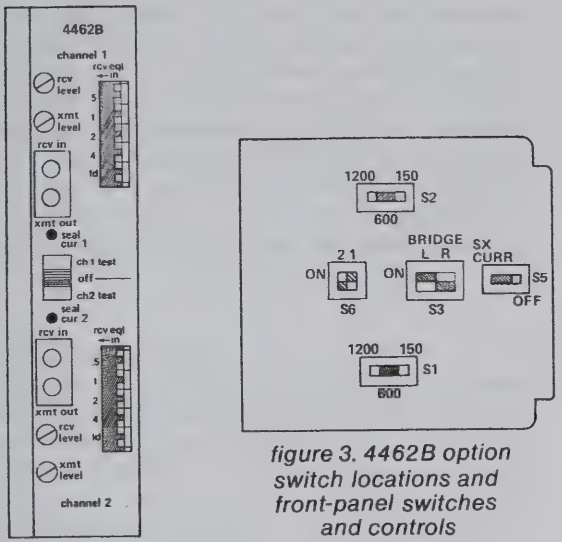


figure 3. 4462B option switch locations and front-panel switches and controls

bridge option

3.09 Although each 4462B in itself establishes a dual 4wire conference bridge, the bridge size in a 24X Assembly can be expanded up to and including all 4462B modules in the shelf, if required, depending upon the setting of DIP switch *S3*. Switch *S3-1* determines whether or not the 4462B interfaces the module located directly to its right in the shelf (as viewed from the front). Setting the switch to *ON* allows the interface; *OFF* disables it. Switch *S3-2* serves the same function except that it affects the module to the left. Thus, any number of 4462B's (up to 12 in a 19-inch assembly and up to 14 in a 23-inch assembly) may be used to form an expanded bridge. In addition, switch S3 allows a number of discrete conference bridges to coexist within the same 24X Assembly. For example, the 4wire 6way conference bridge shown in figure 3 may be implemented by using three 4462B modules with their bridge switches *(S3)* arranged as follows: position A, *S3-1 OFF, S3-2 ON;* position B, *S3-1* and *S3-2 ON;* position C, *S3-1 ON, S3-2 OFF.* Condition each module as required for the specific installation.

sealing current

3.10 When switch *S5* is set to the *SX CURR* position, the 4462B provides 20mA of internally generated sealing current on the facility side. When *S5* is in the *OFF* position, the module provides normally derived simplex leads. If the installation requires sealing current, set *S5* to the *SX CURR* position. If sealing current is not required or if simplex leads are required, set *S5* to the *OFF* position.

A. Set the channel-1 *ld/nld* switch to *nld.* Set all prescription equalizer switches to *OUT.* Set the test switch to *1.* Turn the channel-1 *rcv* and *xmt* controls fully counterclockwise. The *seal cur 2* LED should now be on.

B. Request the distant end to send a 1004Hz test tone at the output level specified on the circuit layout record (CLR). Adjust the *rcv* level control until the *seal cur 2* LED goes out, but not far enough to cause the *seal cur 1* LED to go on. The incoming signal is now properly adjusted to the predefined bus level.

C. Adjust the *xmt level* control until the returned signal level at the distant end coincides with that specified on the CLR.

D. As an alternate method, the front-panel *rcv in* and *xmt out* test jacks can be used in conjunction with local test equipment to perform the procedures described in steps B and C.

alignment: equalization

3.12 To adjust the receive-path equalization on the 4462B, proceed as follows. Determine the amount of equalized gain required at 2804Hz (re 1004Hz).

A. Arrange the receive portion of the TMS for 600-ohm terminated measurement and connect it to the module's *rcv out*jack.

B. Request the distant facility-side location to send 1004Hz and 2804Hz tone at the level specified on the circuit layout record (CLR). Measure and record each level.

C. If the SF signaling facility consists of nonloaded cable, subtract the 2804Hz level measured in step B from the 1004Hz level also measured in step B.

D. Set to *IN* the proper combination of DIP-switch *rcv equal* positions that approximate as closely as possible the difference determined in step C (the amount of equalized gain required), as directed in table 4. If no equalization is required, ensure that no positions of the *rcv equal* DIP switches are set to *IN.*

alignment: levels

3.11 The receive ports of the 4462B can accept transmission levels from −23 to +7dBm, and the transmit ports can provide transmission levels from −20 to +10dBm. After ensuring that the module is properly optioned, install it in its mounting position and apply power. The procedure described below, although mentioning only channel-1 alignment, is also applicable to channel-2 alignment.

Note: *When aligning channel 2, the* **test** *switch must be set to the* **2** *position.*

1000Hz/2804Hz difference (in dB)	required amount of equalization (in dB)
0	0.0
−0.3 to −0.7	0.5
−0.7 to −1.2	1.0
−1.2 to −1.7	1.5
−1.7 to −2.2	2.0
−2.2 to −2.7	2.5
−2.7 to −3.2	3.0
−3.2 to −3.7	3.5
−3.7 to −4.2	4.0
−4.2 to −4.7	4.5
−4.7 to −5.2	5.0
−5.2 to −5.7	5.5
−5.7 to −6.2	6.0
−6.2 to −6.7	6.5
−6.7 to −7.2	7.0
−7.2 to −7.7	7.5

table 4. Equalized gain settings from cable loss date

3.13 Table 2 in section 2 of this practice illustrates in greater detail how the prescription slope equalizer affects the total frequency response of the receive path of the module with the *ld/nld* switch in the *nld* position. Please note that the equalizers have an attenuating effect on frequencies below 1004Hz. Setting the *ld/nld* switch to the *ld* position with any of the prescription slope equalizer switches set to *IN* introduces additional low-frequency attenuation in the amounts shown in table 1.

4. circuit description

4.01 This circuit description is intended to familiarize you with the 4462B 4Wire 2Way Conference Bridge modules for engineering and application purposes only. Attempts to test or troubleshoot the 4462B internally are not recommended and may void your Tellabs warranty. Procedures for recommended testing and troubleshooting in the field are limited to those prescribed in section 7 of this practice. Please refer to the 4462B Block Diagram, section 5 of this practice, as an aid in following this circuit description.

4.02 The 4462B contains circuitry to interface two 4wire voice-frequency facilities (channel 1 and channel 2). Level control and impedance matching are provided for the receive and transmit ports of each 4wire VF channel. In addition, the 4462B provides receive-path post-equalization for loaded or nonloaded cable. The module also contains test and level-detection circuitry, sidetone circuitry, summing and buffer amplifiers for busing, an internal sealing current source, and a power supply. Each of these sections is described below.

power supply

4.03 The *power supply* in the 4462B is a series voltage regulator that uses a zener diode as a reference source. A series diode in the negative input lead protects the circuit against reverse voltage connections, and a metal-oxide varister between input battery and ground limits high-level supply transients to a safe level.

sealing-current option

4.04 Switch *S5* selects either internally supplied sealing current or balanced simplex-lead derivation. This switch affects both channels 1 and 2. When the internal source is selected, sealing current at 20mA is fed to the external 4wire facilities through the transmit output ports and is returned to the module through the receive input ports. A ZAP feature provides a greater amount of sealing current (34 to 51mA) for approximately 1 second when power is initially applied to the module. Sealing current flow is indicated by two front-panel LED's.

receive ports

4.05 The 4462B interfaces the 4wire facilities through the channel-1 and channel-2 constant-impedance transformers, each of which are center-tapped to derive a balanced simplex lead. A silicon transient suppressor is provided on the secondary of each transformer, and each port can be optioned for balanced impedance of 150, 600, or 1200 ohms.

4.06 Operational amplifier integrated circuits (op-amp ICs) provide voltage gain at the receive ports. The voltage-gain stage uses negative feedback to enhance amplifier stability and setability, and gain is adjusted by varying the negative feedback. This approach to gain control provides, in addition to optimum gain setability, optimum output signal-to-noise performance. The gain of this stage can be adjusted via a front-panel control over a 30dB signal range. Either or both receive paths can be optioned to provide sidetone at −20dB.

4.07 On the 4462B, the secondary windings of each receive port feed a series-connected *equalization amplifier* which contains both a compromise-bump and prescription-slope equalizer. The compromise bump equalizer is activated via the *ld/nld* switch and its characteristics are shown in table 1 (section 2 of this practice). The prescription slope equalizer is inserted into the receive path when any of the front-panel *rcv equal* DIP switches are set to *IN*. The characteristics of the prescription slope equalizer are shown in table 2.

4.08 Like the receive ports, the transmit ports of the 4462B use a constant-power output transformer to interface to the external facilities and to derive simplex leads. Lightning protection and impedance matching are similar to that of the receive ports.

4.09 A voltage-gain amplifier similar to that of the receive ports is used to give each transmit a 30dB output level range. This amplifier then drives a push-pull output driver that provides the increase in current required by the output transformer.

summing and buffer amplifiers

4.10 Summing amplifiers are also provided on the 4462B. Signals from the receive ports are brought into these amplifiers and are passed to the conference busses and to the opposite-channel transmit port. Signals from the conference busses also enter these amplifiers and are passed to the transmit ports. The summing amplifiers are op-amp ICs with the amplifier loop gain set to unity. The summing amplifiers, along with two buffer amplifiers, isolate the transmit- and receive-port voltage-gain amplifiers from the conference busses.

test and level-detection circuitry

4.11 Level-detection circuitry is provided on the 4462B as an aid in circuit alignment and to maintain a constant conference bus level. When the front-panel test switch is set to either of the test positions, the level-detection circuit is active. This switch also isolates the selected channel from the conference, and connects its receive and transmit ports to allow setting of gain and equalization. It also connects the sealing-current LED's to allow them to function as part of the level-detection circuitry.

4.12 Two sections of a quad op-amp IC are used for the level detection circuit. These amplifiers are used as voltage comparators with a window approximately 0.5dB wide at −13dBm. The voltage comparators each drive one of the sealing current LED's to give overrange *(seal curr 1)* or underrange *(seal curr 2)* indication.

test jacks

4.13 Bantam-type opening test jacks are provided at the facility ports of both 4wire channels. These front-panel jacks isolate the module from the facility when a plug is inserted to allow testing and alignment.

6. specifications

rcv port (either 4wire channel)

input impedance
150 ohms 15%, 600 ohms 10%, or 1200 ohms 10%, switch selectable

simplex current
120mA maximum, 5mA maximum unbalance; ZAP feature provides 34 to 51mA for approximately 1 second on power-up

input signal range
−23 to +7dBm

sidetone level
−20dB (with internal bus aligned), switch selectable

frequency response (no equalization)
0.5dB, 300 to 4000Hz (re 1004Hz)

receive equalization
prescription-slope-type: 0.0 to 7.5dB of gain (in switch-selectable 0.5dB increments) at 2804Hz re 1004Hz
compromise bump-type: 3.0dB bump at 3200Hz re 1004Hz and 1.5dB loss at 404Hz re 1004Hz
additive mode: if both equalizers are used simultaneously, the results are additive: at a given frequency, the amount of equalization provided is the sum of the amounts listed in tables 1 and 2 of this practice

xmt port (either 4wire channel)

output impedance
150 ohms 15%, 600 ohms 10%, 1200 ohms 10%, switch selectable

simplex current
120mA maximum, 5mA maximum unbalance

output signal range
−20 to +10dBm (with internal bus aligned)

frequency response
0.5dB , 300 to 4000Hz (re 1004Hz)

noise
20dBrnC maximum

total harmonic distortion
less than 1% at +10dBm level

crosstalk loss between receive and transmit ports of same 4wire channel
greater than 60dB at 1000Hz
greater than 55dB at 3000Hz

delay distortion
less than 100μ, 400 to 3000Hz

common specifications

input voltage
without internal-sealing-current option activated: −22 to −56Vdc, filtered, ground referenced
with internal-sealing-current option activated: −42 to −56Vdc, filtered, ground referenced

maximum input current
40mA at idle, 75mA at maximum input and output levels (both channels active), with an additional 42mA required with sealing current flowing in both 4wire facilities

operating environment
20° to 130°F (−7° to 54°C), humidity to 95% (no condensation)

dimensions
5.58 inches (14.17cm) high
1.42 inches (3.61cm) wide
5.96 inches (15.54cm) deep

weight
1 pound (454grams)

mounting
one position of Tellabs 24X Mounting Assembly or Tellabs Type 10 Mounting Shelf

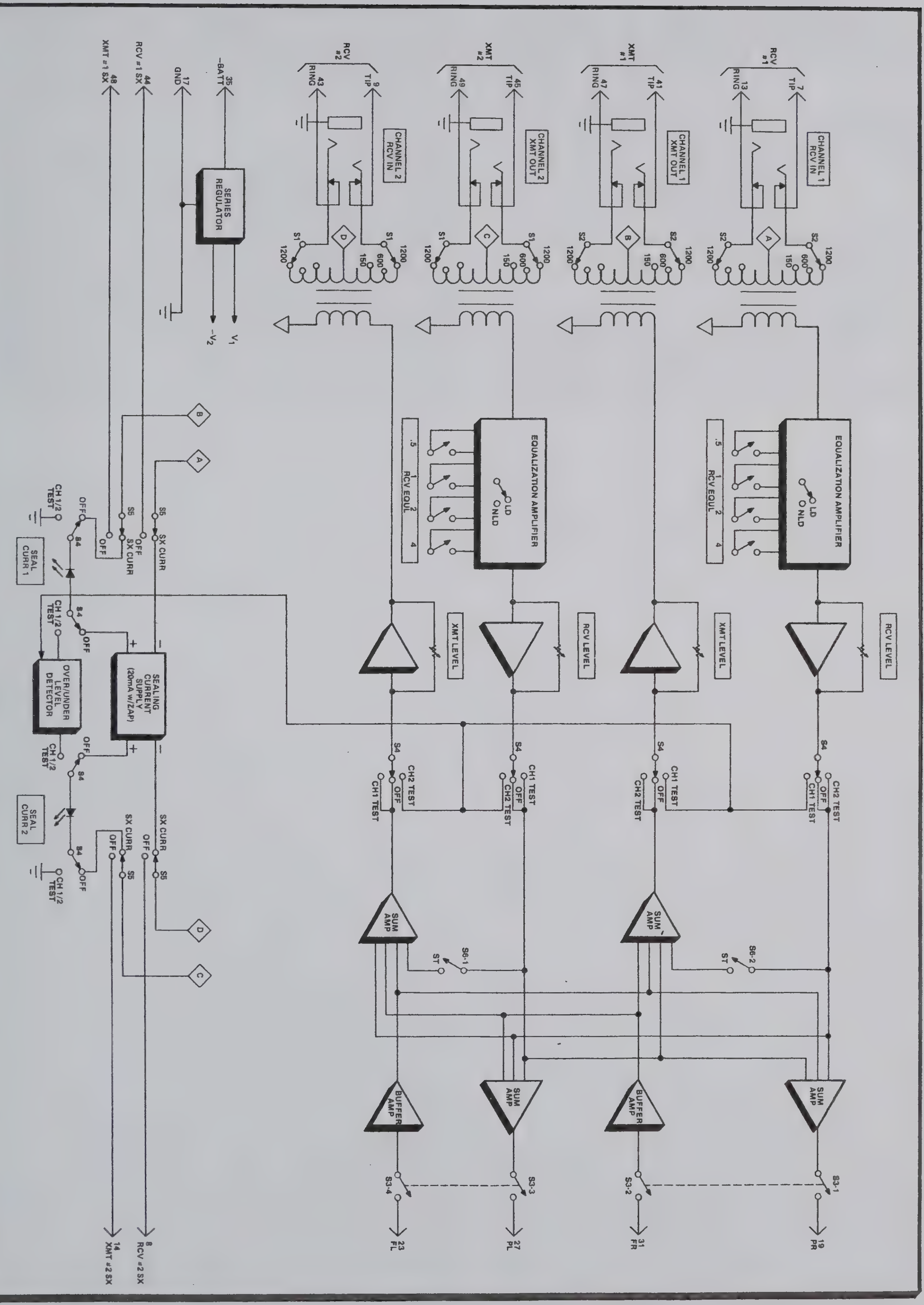
7. testing and troubleshooting

7.01 The *testing guide checklist* in this section may be used to assist in the installation, testing, or troubleshooting of the 4462B module. The checklist is intended as an aid in the localization of trouble to a specific module. If a module is suspected of being defective, a new one should be substituted and the test conducted again. If the substitute module operates correctly, the original module should be considered defective and returned to Tellabs for repair or replacement. We strongly recommend that no internal (component-level) testing or repairs be attempted on the 4462B module. Unauthorized testing or repairs may void the module's warranty.

Note: *Warranty service does not include removal of permanent customer markings on the front panels of Tellabs modules, although an attempt will be made to do so. If a module must be marked* **defective,** *we recommend that it be done on a piece of tape or on a removable stick-on label.*

7.02 If a situation arises that is not covered in the checklist, contact Tellabs Customer Service at your Tellabs Regional Office or at our Lisle, Illinois or Mississauga, Ontario Headquarters. Telephone numbers are as follows:

US central region: (312) 969-8800
US northeast region: (412) 787-7860
US southeast region: (305) 645-5888
US western region: (702) 827-3400
Lisle Headquarters: (312) 969-8800
Mississauga Headquarters: (416) 624-0052



4462B 4Wire 2Way Conference Bridge module 814462B

5. block diagram

7.03 If a 4462B is diagnosed as defective, the situation may be remedied by either *replacement* or *repair and return.* Because it is more expedient, the *replacement* procedure should be followed whenever time is a critical factor (e.g., service outages, etc.).

replacement

7.04 To obtain a replacement 4462B module, notify Tellabs via letter (see addresses below), telephone (see numbers above), or twx (910-695-3530 in the USA, 610-492-4387 in Canada). Be sure to provide all relevant information, including the 8X4462B part number that indicates the issue of the module in question. Upon notification, we shall ship a replacement module to you. If the module in question is in warranty, the replacement will be shipped at no charge. Pack the defective 4462B in the replacement module's carton, sign the packing slip included with the replacement, and enclose it with the defective module (this is your return authorization). Affix the preaddressed label provided with the replacement module to the carton being returned, and ship the module prepaid to Tellabs.

repair and return

7.05 Return the defective 4462B module, shipment prepaid, to Tellabs (attn: repair and return).

in the USA: Tellabs Incorporated
4951 Indiana Avenue
Lisle, Illinois 60532

in Canada: Tellabs Communications Canada, Ltd.
1200 Aerowood Drive, Unit 39
Mississauga, Ontario, Canada L4W 2S7

Enclose an explanation of the module's malfunction. Follow your company's standard procedure with regard to administrative paperwork. Tellabs will repair the module and ship it back to you. If the module is in warranty, no invoice will be issued.

testing guide checklist

test	test procedure	normal result	if normal conditions are not met, verify:
receive-path (bus level) adjustment	Set *test* switch to position 1 or 2 for channel being tested. Arrange transmit portion of TMS for 1004Hz tone output at −10dBm and at facility-side port impedance selected on module. Connect this signal to *rcv in* jack.	Adjust *rcv level* until both *seal curr* LEDs are off ☐.	Power ☐. *Test* switch in proper position ☐. Terminating impedance correct ☐.
transmit-path level adjustment	Set *test* switch to position *1* or *2* for channel being tested. Connect properly terminated TMS to *xmt out* jack of channel under test. Insert a 1004Hz test tone at a level of −10dBm into *rcv in* jack. Observe level at TMS when *xmt level* control is adjusted fully CW and fully CCW.	*Xmt level* fully CW: xmt output greater than +10dBm ☐. *Xmt level* fully CCW: xmt output less than −20dBm ☐.	Power ☐. *Test* switch in proper position ☐. Terminating impedance correct ☐. *Rcv level* set as above ☐.
receive-path equalization, compromise bump for loaded cable	Maintain connections as above. Adjust output level for 0dBm at 1004Hz. Set all *rcv equal* switches to *out*. Set *ld/nld* switch to *ld*. Observe level readings on TMS at 404Hz, 1004Hz, and 2804Hz.	TMS readings should be: approx. 0dBm at 1004Hz ☐. approx. −1.5dBm at 404Hz ☐. approx. +1.1dBm at 2804Hz ☐.	Power ☐. Wiring ☐. Terminating impedances correct ☐. Slide *rcv equal* and *ld/nld* switches to back and forth to clean contact surfaces ☐. Impedance options correctly set ☐. Input signal source level constant over test range ☐. Output level not exceeding +10dBm overload point ☐.
receive-path equalization, prescription slope for nonloaded cable	Maintain connections and 1004Hz level as above. Set all *rcv equal* switches to *IN*. Set *ld/nld* switch to *nld*. Observe level readings on TMS again at 404Hz, 1004Hz and 2804Hz.	TMS readings should be: approx. 0dBm at 1004Hz ☐. approx. −2.7dBm at 404Hz ☐. approx. +7.3dBm at 2804Hz ☐.	Power ☐. Wiring ☐. Impedance options correct ☐. Slide *rcv equal* and *ld/nld* switches back and forth to clean contacts ☐. Input signal level constant over test range ☐. Output level not exceeding +10dBm overload point ☐.
noise	Disconnect transmit portion of TMS. Insert shorting plug into *rcv in* jack. Arrange receive portion of TMS for C-weighted noise measurement (or use noise test set) and connect to *xmt out* jack. Set *ld/nld* switch to *nld*. Set *rcv equal* switches to *IN* and adjust *xmt level* control over its entire range, and observe noise readings. Repeat with *rcv equal* switches out.	Measured noise less than 20dBrnC for all gain settings and both equalizer settings ☐. Noise level follows *xmt level* setting ☐.	Noise test set at proper terminating impedance ☐. High RF environment affecting test set ☐.
sealing current	With channel optioned for sealing current, connect VOM between *xmt out* jack and *rcv in* jack (VOM should be arranged to measure up to 50mA).	VOM reads approximately 20mA ☐.	Switch *S5* set to *SX CURR* ☐. *Test* switch set to *off* ☐. Replace module and retest ☐.

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technical manual
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Addendum: 4462B 4Wire 2Way Conference Bridge Module

1.01 This addendum is issued to correct the switch-optioning information in paragraph 3.09 of Tellabs practice section 814462B dated 1 February 1984.

1.02 Paragraph 3.09 of the 4462B practice incorrectly states that position *1* of DIP switch *S3* on the 4462B module allows interface with modules to the right of the 4462B, and that position *2* of *S3* allows interfacing with modules to the left of the 4462B. Actually, the opposite is true: *S3-1* allows interfacing to the left and *S3-2* allows interfacing to the right of the 4462B. Therefore, cross out paragraph 3.09 of the 4462B practice and replace it with the following improved and corrected version:

bridge option

3.09 Although each 4462B in itself establishes a dual 4wire conference bridge, the bridge size in a 24X Assembly can be expanded up to and including all 4462B modules in the shelf, if required, depending upon the setting of the *BRIDGE* DIP switch, *S3*. Switch *S3-1* determines whether or not the 4462B interfaces the module located directly to its left in the shelf (as viewed from the front.) Setting the switch to *ON* allows the interface; *OFF* disables it. Switch *S3-2* serves the same function except that it affects the module to the right. Thus, any number of 4462B's (up to 12 in a 19-inch assembly and up to 14 in a 23-inch assembly) may be used to form an expanded bridge. In addition, switch *S3* allows a number of separate and independent conference bridges to coexist within the same 24X Assembly. For example, the 4wire 6way conference bridge shown in figure 3 may be implemented by using three 4462B modules with their *BRIDGE* switches (*S3*) arranged as follows:

- Module position A: *S3-1 OFF, S3-2 ON* for interface to the right only.
- Module position B: *S3-1 ON, S3-2 ON* for interface to both the left and the right.
- Module position C: *S3-1 ON, S3-2 OFF* for interface to the left only.

In your particular application, option each 4462B module as required for its position as part of a bridge in the 24X Assembly.

XEL
Communications, Inc
®
C4236-A00
2-Wire/4-Wire Amplifier
SF-to-FXS/FXO Converter
2713 Hz Loopback

442-D4200-62 October 11, 1990

Installation and Alignment Procedure

Refer to the illustrations of the switches and to the table as an aid in aligning the unit.

Set all sections of S1T, S2T, S4T, and S5T to the OUT position before beginning. Set S2S to FXO and S4S to LS. These switches will be readjusted later.

Impedance Settings

Step 1. Set the FAC impedance switch, S3T, to 1200 ohms for loaded cable, 600 ohms for nonloaded cable, or to 150 ohms to provide some equalization on nonloaded cable facilities.

Step 2. Set the EQPT impedance switch, S7T, to match the impedance connected to the 2-wire port.

Step 3. Set switch S1N to the impedance of the far end. This is usually the same as the setting of S7T.

Receive Channel Alignment

Step 4. Set the front panel Receive switches, S5T, to the difference between the Receive IN level and +7 dBm. If the Receive IN level is less than +7 dBm, set the top section of S5T to the G (gain) position. If the Receive IN level is greater than +7 dBm, set the top section of S5T to the L (loss) position.

Step 5. Set the Receive Pad switch, S1S (located on the signaling board), to the difference between +7 dBm and the desired 2-Wire OUT level.

Step 6. Have a 3004 Hz tone at the specified TLP (Transmission Level Point), sent from the far end. Measure the 3004 Hz level at the 2-Wire OUT jack. If necessary, adjust the 3 kHz section of switch [illegible]T for the required 3 kHz output level.

Step 7. Change the frequency from the far end to 300 Hz. If necessary, adjust the 300 Hz section of switch S4T for the 300 Hz output level.

Step 8. Make an additional frequency run at 300 Hz, 1004 Hz, and 3004 Hz to ensure that the levels fall within the circuit conditioning requirement.

Transmit Channel Alignment

Step 9. Set the Transmit Pad switch, S3S (located on the signaling board), to the difference between the 2-Wire IN level and -16 dBm.

Step 10. Set the front panel Transmit switches, S2T, to the difference between -16 dBm and the desired Transmit OUT level. If the Transmit OUT level is greater than -16 dBm, set the top section of S2T to the G (gain) position. If the Transmit OUT level is less than -16 dBm, set the top section of S2T to the L (loss) position.

Step 11. Apply a 3004 Hz tone at the specified TLP to the 2-Wire port, and measure at the Transmit OUT jack. If necessary, adjust the 3 kHz section of switch S1T for the required 3004 Hz output level.

Step 12. Change the 3 kHz frequency to 300 Hz. If necessary, adjust the 300 Hz section of switch S1T for the 300 Hz output level.

Step 13. Make an additional frequency run at 300 Hz, 1004 Hz, and 3004 Hz to ensure that all levels fall within required parameters.

Application Settings

Step 14. Set the Loop Start/Ground Start switch, S4S, to the method in which a call is initiated. LS for Loop Start or GS for Ground Start.

Step 15. Set the FXO/FXS switch, S2S, to the Station (FXS) or Office (FXO) mode.

Loopback Settings

Step 16. Set the loopback Gain/Loss switch for the difference between the 2-Wire input and output levels. If the output level is greater than the input level, set the G/L section of S2L to L (Loss). If the output level is less than the input level, set the G/L section of S2L to G (Gain). This procedure provides "Equal level Loopback."

Loopback Activation

Apply a 2713 Hz frequency to the Receive IN pins for 2.5 seconds or more, and remove the tone. The Loopback LED should light.

NOTE: Pressing the front panel push button, S1L, will cause the circuit to go into loopback and remain in loopback as long as the push button is depressed. Releasing the push button removes loopback from the circuit.

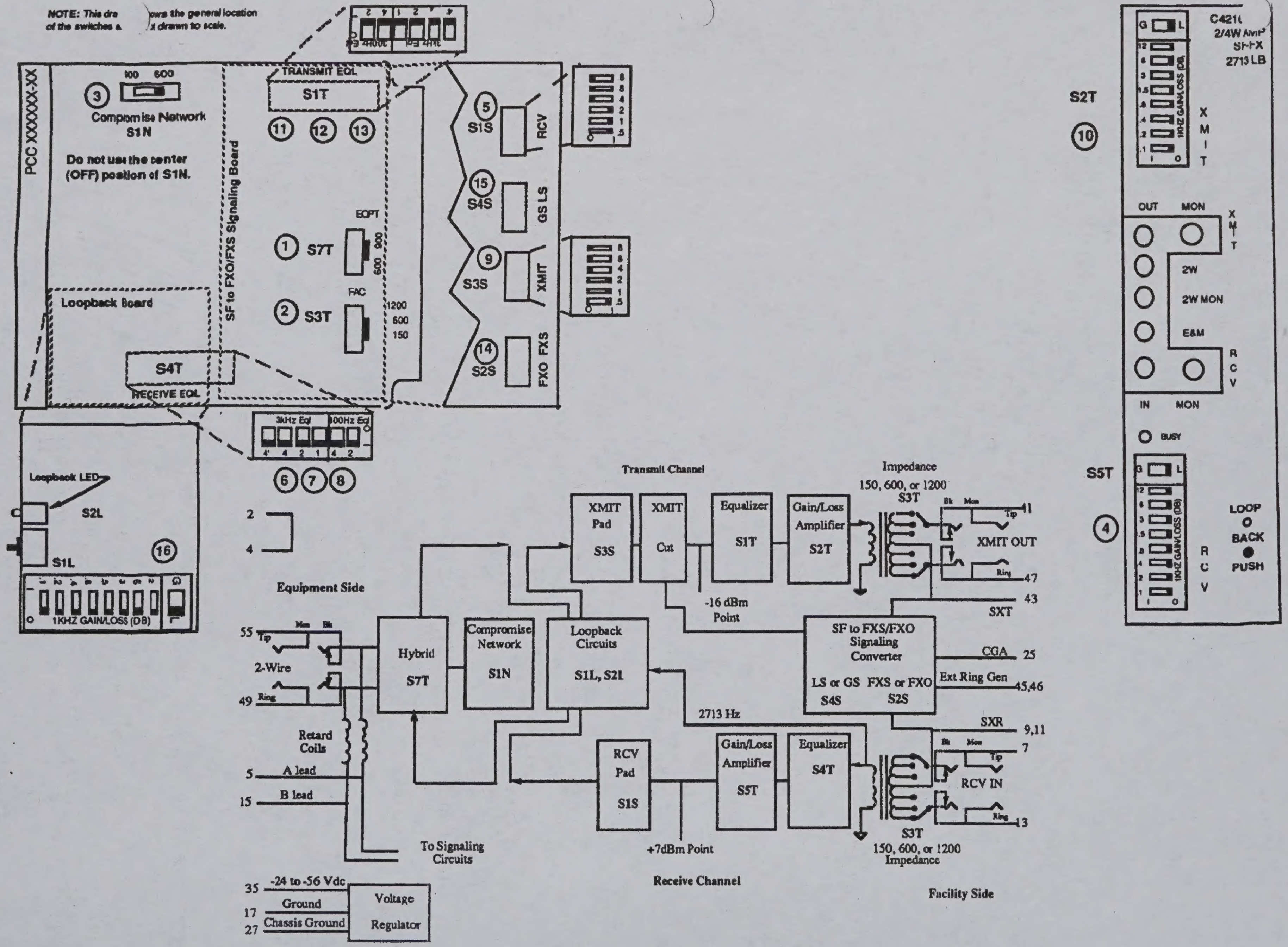
Test the transmission path by sending a test tone to the the Receive IN pins and measuring the return signal from the Transmit OUT pins.

Loopback Deactivation

Release loopback by sending a 2713 Hz tone to the Receive IN pins for 0.9 seconds or more and then removing the tone. The Loopback LED should go out.

NOTE: Loopback automatically deactivates in 20 minutes.

Connect	To Pin
4-Wire Facility Side	
Receive IN (tip)	7
Receive IN (ring)	13
Transmit OUT (tip)	41
Transmit OUT (ring)	47
SXT	43
SXR	9,11
2-Wire Equipment Side	
Tip	55
Ring	49
A	5
B	15
CGA	25
-21 to -56 Vdc	35
Ground	17
Chassis Ground	27



NOTE: This dra ows the general location of the switches a t drawn to scale.

DUO-TANG
53540